

ABSTRACT

A water stream containing hardness minerals is subjected to a water treatment process using an alkali agent to precipitate the hardness minerals and to produce a softened water stream is used to create an integrated water treatment and flue gas desulfurization process. Thereafter, the softened, alkaline water stream is utilized in a scrubber to scrub a flue gas containing sulfur dioxide to produce a sulfur-lean flue gas. The invention may be applied to a steam-based bitumen recovery operation where bitumen, sour produced gas or other sulfur containing fuels are burned for producing steam for bitumen recovery. More specifically, the associated produced water from the bitumen recovery process may be softened for re-use and for utilization as a scrubbing agent for high-sulfur containing flue gas arising from the steam generators. The process provides an economically favorable process while minimizing waste disposal requirements.